Administrator's Column

(In this column, NASA Activities features an article by NASA Administrator James M. Beggs. These articles focus on subjects chosen by him that address topics of broad interest to the agency's employees. The column this month features an address presented to the Second Annual Contractor's Conference at the Marshall Space Flight Center, Huntsville, Ala.)

Quality And Productivity Is Our Goal

I am very pleased to see this growing interest in achieving higher contractor/NASA team quality and productivity.

This second annual contractor's conference is unique to government. Other agencies probably have gone out and asked their contractors how to make their job easier. But none have deliberately gone back and reported its progress. Two NASA centers, Johnson and Marshall, have gone even one step further—they worked with their contractors to develop a productivity implementation plan to make them even more responsive.

But let us not fool ourselves, we are dealing with complex issues that require a great deal of thought to formulate effective implementation plans. We must continually remind ourselves of our objective—to bring performance and quality to world class competitive levels. Nothing less will suffice these days.

All of society is concerned and disturbed about our national level of quality and productivity. Government and industry have a special obligation to alleviate this concern. As a team, we have a huge stake in helping to improve the situation. Our budgets are tight and our image precarious. We have the opportunity to provide leadership because of our history of excellence. We have committed ourselves to do so. I am encouraged by your presence and the growing number of initiatives that you have taken, and I am pleased that you also share our commitment.

It's clear that NASA's role in driving new technology lets us exert a degree of influence out of proportion to our size or funding. The word is leverage. Today's technical and management challenges underscore the fact that NASA must continue to use that leverage in ways that will foster improved national capabilities. Indeed, our challenge is to manage, motivate and create an environment for our employees in which they give the best that is in them: in performance, in creative ideas, in dedication and in skills.

More that 200 years ago, Lord Chesterfield, in a letter to his son, put that challenge this way: "Aim at perfection in everything, though in most things it is unattainable; however, they who aim at it, and persevere, will come much nearer to it than those whose laziness and despondency make them give up as unattainable."

Our aim is to come as near to perfect as we can in all we do and all we produce. For NASA, this means better training of both workers and managers. It means reshaping attitudes so that all employees can be part, indeed, part of the action. It means stressing innovation, and looking for ways to streamline our management processes. And it means placing the highest priority on quality and productivity improvement. Today, we are doing all of those things and more.

As the Japanese and others produce higher quality goods and carve even bigger niches in American markets, our emphasis on excellence is more important than ever. The real measure of our performance is productivity growth. Here our annual growth rates, while recently advancing at about 3 per cent, still do not measure up to Japan's 6 per cent, for example; or to West Germany's 4.5 per cent or to France's 4 per cent. Unless we can show an ability for productivity growth that is competitive worldwide for the long term, we will continue to lose ground to others.

I believe that economic growth and prosperity only can be sustained for the long term by improvements in productivity and quality. Such improvements will be fundamental in helping to restore America's competitive strength in the world. And they will shape our economic future over the remainder of this century and well into the next.

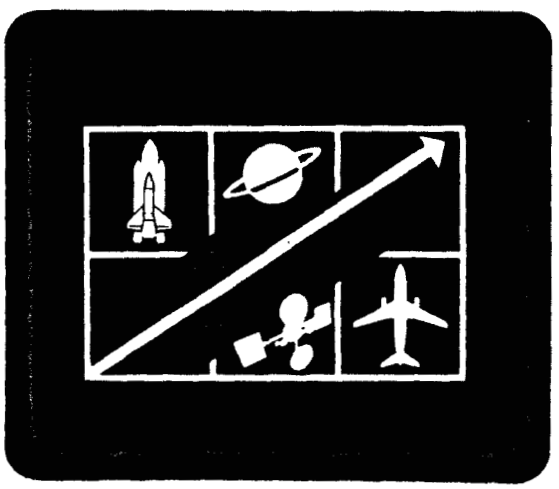
This is a nationwide challenge. A couple of years ago we decided that NASA has a special role in helping to meet it, because, for most Americans, NASA epitomizes excellence. Indeed, for more that 26 years NASA has stood for what is best about America—technology leadership, management innovation and a can-do spirit that demonstrates that nothing is impossible if we apply teamwork, commitment for success, and remain open to ideas for improvement.

So, we decided that NASA would help get America back on the competitive track by spearheading a drive to restore national excellence through improvements in quality and productivity.

We started with our own organization. After all, Mark Twain once wrote, "few things are harder to put up with than the annoyance of a good example."

Looking at it that way, we'll be very pleased if our program becomes a major national annoyance. And if it does, we will be proud to take the credit for helping to get American industry on the winning track again.

Recently we established a permanent office of NASA productivity programs. We issued policy statements to ensure NASA's leadership in the development and application of advanced technology and management practices which contribute to both agency and national productivity. Our policy states that we will provide a participative and challenging environment for all employees, so that they have the opportunity to perform the best job they can and be involved in the organization's success. It commits NASA to develop a team approach with its contractors and support modernization and high quality as a philosophy both internally and externally, to achieve the highest levels of quality and productivity.



NASA Productivity Office emblem

Our NASA corporate policy is based on the philosophy that reflects the basic principles of participative management—respect for the individual and a belief that decentralized decision-making and the team approach to problem solving encourage innovation and reveal talent which otherwise might go untapped.

Our goal is to motivate all team members: NASA and contractor employees, from top managers on down, to participate in improving overall performance. Every employee must feel that he or she has a stake in making the system work better. Because only through participation across the board can we achieve higher quality products and greater individual and institutional performance in what we do.

The foundation upon which we are building to improve performance and revitalize our organization is in a document called "NASA Management Principles to Achieve Excellence." These principles are our 13 commandments, they embody our basic beliefs, our commitments and our motives. They also exemplify the best of the NASA culture for the first 26 years. Following these principles has allowed the agency to be managed so successfully over the years to make the impossible possible.

With many recent retirements in the agency work force, we wanted to assure that these principles for achieving excellence, which have brought proven success, were handed down to succeeding generations of employees as they came onboard. A copy has been sent to each employee in the agency. We are not leaving management training to chance. The principles are being incorporated into training programs. And they have been used, more importantly, to assess the effectiveness of the present day organizations by top and middle management.

We recently took a good look at ourselves in light of these principles. And we found some agency impediments to quality and productivity. As a result of this review, we are focusing on three areas—modernization, reducing the bureaucracy and further delegating authority down to the lowest practicable level to increase individual motivation, initiative and creativity. Our productivity steering committee has met to identify steps for long-term, continuous improvements.

Shakespeare wrote: "No perfection is so absolute that some impurity doth not pollute." None of us are perfect. But we'll do all we can to aim to be.

I am here today to reinforce a commitment to you. It is that we intend to do everything we can to work with you to ensure excellence in all that you do for us. The aerospace industry is under fire these days. Many are questioning its integrity in conducting government work. Together, we can help turn this situation.

We need to reinforce a management style that encourages our employees—contractors and staffers alike—to make suggestions for continuous improvements. We are beginning to see this happen in concrete ways in a few centers. Contractors are proposing the establishment of suggestion programs, particularly in the major hardware contracts. Another example is occuring with NASA employee teams and quality circles. The sessions are well organized and well attended. Many contractor employees come. The

sessions are proving to be effective tools for quality improvements at all levels! Another idea receiving attention is the assignment on major contracts of full time quality and productivity managers to encourage improvements. This is an area that deserves as much attention as schedules and resources.

Last fall, NASA sponsored a symposium of high level leaders from some of the most successful organizations in the country. These leaders discussed the reasons the United States has lost some of its competitive clout in the world. They also talked about their respective approaches to enhancing productivity. A recurring theme throughout the symposium was that improvements in quality lead to high productivity and reduced costs. In many organizations, total defect costs range from 15 to 40 per cent of budgets. For maximum organizational effectiveness, continuous improvement goals are needed. And management must be totally committed to them.

Clearly, management needs to encourage innovation and improvement and create an environment that rewards and supports it. Maintaining the creative and quality attitude makes an organization successful. We have seen that the vigor of successful corporations comes from very high levels of performance "over and above" that are normally expected. To build dedication, pride and team effort, management needs to encourage and provide positive support for employee participation.

We also have seen that as successful organizations mature, they tend to become bogged down with controls and rules that are stifling and inflexible. They lose their ability to take the kinds of risks that made the organizations successful in the first place. Management can thwart this tendency through positive actions, such as greater decentralization and more freedom and protection for innovators. Demonstrating belief in people by pushing responsibility to the lowest levels of an organization is the best way to tap individual talent and make innovation a reality.

This conference is aimed at sharing experience with initiatives being taken. I am confident that together, we can and will evolve new and innovative management ideas and concepts that will contribute to high quality and productivity.

I would like to call your attention to a recent report by the President's Commission on Industrial Competitiveness. Its findings summarize what we all know: technology is highly mobile. Other nations are applying it more aggressively than we are, along with their financial and human resources, to develop manufacturing expertise. Consequently, our competitors, especially the Pacific rim nations, produce goods that are more attractive in price and quality.

Reflecting our dismal record in productivity, America's standard of living has grown more slowly than that of our trading partners. Since 1960 our 2 percent growth rate is exceeded by Canada, Germany, France, Italy and Japan. We lead only Britain in growth of standard of living and in that case—just barely.

The commission made recommendations in four areas:

- Coordinating international trade policies with a view to giving it more priority attention.
- Increasing the supply of investment capital and reducing its cost for industry to improve its competitive position.
- Developing a more skilled, flexible and motivated work force.
- Creating, applying and protecting new technology.

NASA's influence and purview being what it is, I believe we have opportunities to impact the latter two areas—that of unleashing the talent we have in the work force and that of protecting our technological position. However, I invite you to review the report yourselves and marshal your corporate management to do whatever you can—our national standard of living—indeed, our economic future, could depend on the nature of your response.

There is much work to be done. The message is clear: U.S. organizations cannot continue to do business as they have in the past. Even high technology is not immune and must adapt, adjust and change in order to survive.

Quality performance is our litmus test. We aim to get rid of shoddy workmanship, defective materials, inadequate quality control, cost overruns and all of the other things that are counter-productive and hurt the program.

Clearly, we live at a time when the public has become keenly aware of what the competition can deliver. They have grown impatient with poor quality and with government inaction. It is a time when management and employees can no longer afford to be patient with outmoded procedures and shoddy workmanship.

Thomas Jefferson once put it this way: "Laws and institutions must go hand in hand with the progress of the human mind. . . . as new discoveries are made, new truths disclosed, and manners and opinions change with the change of circumstances, institutions must advance also, and keep pace with the times."

"Institution must advance." Jefferson and his associates saw that point clearly and the fruit of their vision was a new nation.

I am confident that working together we can and will

meet our goals. We can set an example for others to emulate. And when we do, both NASA and nation will be the winners.

Effects of Space on Human System Probed at JPL

Today the greatest challenge of space flight still persists — studying and remedying the effects of weightlessness, particularly during long missions.

Skylab proved that man could live and work in space for extended periods of time. And although biomedical problems persist, the Space Shuttle continues to make space flight seem routine. The advent of the Space Station, however, brings some of the old, nagging problems back to life.

According to Dr. Douglas O'Handley, manager of the JPL Life Sciences program, scientists and medical doctors will learn more about cardiovascular deconditioning, bone demineralization and high energy radiation exposure from solar flares — the effects commonly associated with long-duration space flight — after monitoring and examining astronauts working on the Space Station.

JPL's Life Science program is seeking solutions for biomedical problems associated with the Space Station and the problems which still affect shuttle astronauts.

The lab also is involved in biological research, exploring the application of remote sensing technology to public health issues, and developing wider uses for biomedical technology.

JPL has been involved in life sciences for about 7 years. But the lab's involvement has grown and JPL now specializes in developing medical instruments used in space. Researchers are working to improve non-invasive techniques of examining and monitoring astronauts.

JPL is interested in developing instruments that will enable ground-based doctors to predict, then prevent infectious diseases from spreading while astronauts are in space. The program also is interested in developing instruments that could evaluate the impact of continuous low-level exposure to harmful radiation.

In space, high energy radiation is a serious threat. Flight trajectories have been planned with solar activity in mind, according to O'Handley. "No one really understands the damage radiation will do when it hits cells in the human body," he added.

Solar flares release massive quantities of harmful radiation into space. While astronauts inside the spacecraft are somewhat shielded, astronauts working outside the Shuttle or Space Station would not be adequately protected. And astronauts are exposed to more radiation the longer they are in space, a problem since Space Station astronauts will be scheduled for 90-day missions, with possible repetitive tours of duty.

"Understanding the effects of biological systems is of paramount importance," O'Handley noted.

Another effect of weightlessness is bone demineralization. Astronauts flying on Skylab were observed to progressively lose calcium from their bones and experience other skeletal changes. This effect appears to be the most serious biomedical condition associated with long-duration spaceflight. "There is a lot of evidence that bone demineralization will be a serious problem in the Space Station era," he said.

Recent studies have shown that astronauts' heart volume decreases in a weightless environment. Cardiovascular deconditioning is not thought to be a long-term effect since astronauts studied have recovered within a couple weeks after space flight.

"When you are in space flight, your heart really goes on vacation," O'Handley said.

Other information gathered from recent shuttle flights suggests there is approximately a 10 percent fluid shift in astronauts' legs. This decrease of blood volume might represent the body's adaptation to space — but doctors must further investigate the phenomenon to understand it.

Frequently, astronauts have dealt with motion sickness while NASA searched for a remedy. "The answer is becoming very obvious." O'Handley said. "Space motion sickness is just a fact of space flight and we have to develop drugs to accommodate its effects."

In addition to studying the biological effects of spaceflight, NASA Life Sciences is also concerned with in-flight health care and emergency medicine — such as treating injuries that might occur while astronauts are working in space.

The Europeans also are very interested in space medicine. "It is very clear that Europe feels they can make a valuable contribution to the life sciences," O'Handley said, mentioning there are many top-notch doctors in Europe specializing in space medicine.

O'Handley has initiated several international cooperative ventures for NASA Life Sciences and was recently elected a fellow of England's Royal Society of Medicine. O'Handley views his appointment as a reflection of Europe's excitement to become more involved in space medicine.

"Foreign organizations can make significant contributions and play a major role in the space